

REMARKS

This Amendment responds to the non-final Office Action mailed December 7, 2009. Claims 1-6 and 8 are pending. Claims 1-5 have been amended. Claims 25-28 have been cancelled. In view of the following remarks, as well as the preceding amendments, Applicants respectfully submit that all claims in this application are in complete condition for allowance and request reconsideration of the application in this regard.

Rejection under 35 U.S.C. § 112, 2nd Paragraph

Claims 1-6 and 8 stand rejected under 35 U.S.C. § 112, 2nd paragraph. Applicants have amended claims 1-5 in a manner believed sufficient to overcome the rejection.

Rejections under 35 U.S.C. § 102(e)/35 U.S.C. § 103

Claims 1-6 and 8

Claims 1-6 and 8 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over U.S. Patent No. 6,566,704 to Choi et al. (hereinafter *Choi*). Claim 1 is the only independent claim subject to this rejection. Applicants respectfully disagree with this rejection for the reasons set forth below.

The inquiry under 35 U.S.C. § 103 is not whether the differences between the prior art and the claims would have been obvious, but whether the claimed invention as a whole would have been obvious. In this instance, Applicants respectfully submit that the claimed inventions set forth in claim 1 would not have been considered obvious when considered as a whole.

With regard to independent claim 1, the Examiner concludes that “*Choi* et al. do not explicitly state in the embodiment of figure 3F a plurality of semiconducting nanotubes.” To remedy this deficiency, the Examiner contends that *Choi* teaches “a nano sized transistor (see, for example, column 3, lines 39-43)”, and that the proposed modification to *Choi* “would have been obvious ... to use a plurality of semiconducting nanotubes in *Choi* et al.’s device into order

to use the device in a practical application which requires a plurality of semiconducting nanotubes, such as a nano sized transistor”.

Appellants submit that the generalizations regarding the plural term “carbon nanotubes” made at column 3, lines 39-43 of *Choi* fail to support the Examiner’s conclusion that the unit cell shown in Figures 1-3 of *Choi* can be modified to include more than one semiconducting nanotube. The statement made in *Choi* at column 3, lines 39-43 is inconsistent with all other statements found in *Choi* that regard the first embodiment shown in Figures 1-3. At column 3, line 44, *Choi* refers to “a carbon nanotube 100”, which uses the singular indefinite article “a”. From column 3, line 45 to column 4, line 23, *Choi* consistently uses the term “the carbon nanotube” to characterize the unit cell shown in Figures 1-3. The term “nanotube” is singular, not plural. When describing the fabrication process in connection with Figure 3, *Choi* again refers to the growth of “a carbon nanotube”. See col. 4, lines 20-22. Only a single nanotube 100 is visible in Figures 1-3 of *Choi*. When these statements considered as a whole, *Choi* is not suggesting that the embodiment shown in Figures 1-3 can be predictably modified to include a plurality of nanotubes. In fact, the opposite is true in the embodiment shown in Figures 4A and 4B.

Multiple nanotubes (100) are visible in the embodiment shown in Figures 4A and 4B of *Choi*. However, to incorporate multiple nanotubes (100), Figures 4A and 4B of *Choi* teach that the device structure is modified such that the gate electrode (20) and gate dielectric (30) are disposed in a layer stack above the nanotubes (100). Hence, the Examiner’s modification to add multiple nanotubes (100) to the embodiment of Figures 1-3 would lead a person having ordinary skill in the art to stack the gate electrode (20) and gate dielectric (30) above the plurality of nanotubes (100) as shown in Figures 4A and 4B. As a consequence, the channel region of each of the nanotubes (100) would no longer extend vertically through the gate electrode (20), as set forth in Appellants’ independent claim 1. For this reason, a person having ordinary skill in the art would not make the Examiner’s proposed modification to the first embodiment disclose in Figures 1-3 of *Choi*.

The Examiner's rationale for modifying *Choi* is to "use a plurality of semiconducting nanotubes in Choi et al.'s device into order to use the device in a practical application which requires a plurality of semiconducting nanotubes" is circular. The premise and the conclusion of this statement are identical. Accordingly, the Examiner's alleged rationale would not have been an objective rationale to a person having ordinary skill in the art for making the proposed modification to *Choi*.

For these reasons, a person having ordinary skill in the art would not have made the Examiner's proposed modification to *Choi*. Because the Examiner has failed to support a *prima facie* case of obviousness, Applicants respectfully request that the rejection of independent claim 1 be withdrawn.

Claim 1 is patentable for additional reasons.

The Examiner further contends that Figure 4B of *Choi* teaches "connecting the plurality of semiconducting nanotubes with a single drain region 50 and a single source region 40", and that the proposed modification to *Choi* "would have been obvious ... in order to simplify the processing steps of making the device and to simplify the operation of the device". *Choi* discloses that "a source line and a drain line intersect at locations where the carbon nanotubes are grown to form unit cells". As apparent in Figure 4B, the drain lines (50) are arranged in parallel lines or stripes and the source lines (40) are likewise arranged in parallel lines or stripes that are oriented orthogonal to the stripes representing the drain lines (50). Based on this disclosure, each unit cell visible in Figure 4B is located at the intersection of one of the drain lines (50) and one of the source lines (40). In this grid of stripes, each drain line (50) and each source line (40) "intersect" at the location of only a single nanotube (100). Hence, each unit cell in Figure 4B of *Choi* includes only one nanotube (100). However, no pair of the nanotubes (100) disclosed in Figure 4B shares the same source and the same drain. Nanotubes (100) that share the same source line (40) do not share the same drain line (50). Nanotubes (100) that share the same drain line (50) do not share the same source line (40). Therefore, the Examiner's construction of

Figure 4B of *Choi* is incorrect in that Figure 4B fails to disclose a plurality of nanotubes that are connected with a single source region and with a single drain region.

The Examiner's alleged rationale for modifying the structure in Figures 1-3 of *Choi* is to simplify the processing steps of making the device and to simplify the operation of the device. However, the Examiner fails to link these rationales to replacing a single nanotube with multiple nanotubes in the structure of Figures 1-3. Instead, the rationale seems to amount to a conclusion because the Examiner fails to address how the use of multiple nanotubes would actually simplify the process steps of making the device and the Examiner fails to address how the use of multiple nanotubes would actually simplify the operation of the device.

For these additional reasons, a person having ordinary skill in the art would not have made the Examiner's proposed modification to *Choi*. Because the Examiner has failed to support a *prima facie* case of obviousness, Applicants respectfully request that the rejection of independent claim 1 be withdrawn.

Because claims 2-6 and 8 depend from independent claim 1, Applicants submit that these claims are also patentable for at least the same reasons discussed above. Furthermore, these dependent claims recite unique combinations of elements not disclosed or suggested by *Choi*.

Claims 25-28

Claims 25-28 stand rejected under 35 U.S.C. § 102(e) as anticipated by or, in the alternative, under 35 U.S.C. § 103(a) as obvious over U.S. Patent No. 6,599,808 to Kim et al. (hereinafter *Kim*). These claims have been cancelled.

Conclusion

Applicants have made a bona fide effort to respond to each and every requirement set forth in the Office Action. In view of the foregoing remarks and amendments, this application is submitted to be in complete condition for allowance and, accordingly, a timely notice of

allowance to this effect is earnestly solicited. In the event that any issues remain outstanding, the Examiner is invited to contact the undersigned to expedite issuance of this application.

Applicants do not believe fees are due in connection with filing this communication. If, however, any fees are necessary as a result of this communication, the Commissioner is hereby authorized to charge any under-payment or fees associated with this communication or credit any over-payment to Deposit Account No. 23-3000.

Respectfully submitted,

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Date

/William R. Allen/

William R. Allen, Ph.D.

Reg. No. 48,389

WOOD, HERRON & EVANS, L.L.P.

2700 Carew Tower

441 Vine Street

Cincinnati, Ohio 45202

Voice: (513) 241-2324

Facsimile: (513) 241-6234

wallen@whepatent.com